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E-SAFE Relay

User's Manual



Hybrid Relay



WATLOW

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CE
60947

UL
LISTED

English

Rev C
February, 2004

About Watlow Winona

Watlow Winona is a U.S. division of Watlow Electric Mfg. Co., St. Louis, Missouri, a manufacturer of industrial electric heating products since 1922. Watlow products include electric heaters, sensors, controllers and switching devices. The Winona operation has been designing solid-state electronic control devices since 1962, and has earned the reputation as an excellent supplier to original equipment manufacturers. These OEMs and end users depend upon Watlow Winona to provide compatibly engineered controls that they can incorporate into their products with confidence. Watlow Winona resides in a 100,000-square-foot marketing, engineering and manufacturing facility in Winona, Minnesota.

Warranty

The Watlow E-Safe Relay is warranted to be free of defects in material and workmanship for 18 months after delivery to the first purchaser for use, providing that the units have not been misapplied. Since Watlow has no control over their use, and sometimes misuse, we cannot guarantee against failure. Watlow's obligations hereunder, at Watlow's option, are limited to replacement, repair or refund of purchase price, and parts which upon examination prove to be defective within the warranty period specified. This warranty does not apply to damage resulting from transportation, alteration, misuse, or abuse.

Returns

- Call or fax your distributor or the nearest Watlow sales office for best information about returns. (See outside back cover.)
- To return directly to Watlow Winona in the U.S., first call or fax Customer Service for a Return Material Authorization (RMA) number (telephone: +1 (507) 454-5300; fax: +1 (507) 452-4507).
- Put the RMA number on the shipping label, along with on a written description of the problem.
- A restocking charge of 20% of the net price is charged for all standard units returned to stock.

Safety Information

We use note, caution and warning symbols throughout this book to draw your attention to important operational and safety information.

A "NOTE" marks a short message to alert you to an important detail.

A "CAUTION" safety alert appears with information that is important for protecting your equipment and performance. Be especially careful to read and follow all cautions that apply to your application.

A "WARNING" safety alert appears with information that is important for protecting you, others and equipment from damage. Pay very close attention to all warnings that apply to your application.

The safety alert symbol, ⚠ (an exclamation point in a triangle) precedes a general CAUTION or WARNING statement.

The electrical hazard symbol, ⚡ (a lightning bolt in a triangle) precedes an electric shock hazard CAUTION or WARNING safety statement.

Technical Assistance

If you encounter a problem with your Watlow controller, review your configuration information to verify that your selections are consistent with your application: inputs; outputs; alarms; limits; etc. If the problem persists after checking the configuration of the controller, you can get technical assistance from your local Watlow representative (see back cover), or in the U.S., dial +1 (507) 454-5300. For technical support, ask for an Applications Engineer.

Please have the following information available when calling:

- Complete model number
- User's Manual

Your Comments

We welcome your comments or suggestions on this user's manual. Please send them to: Technical Writer, Watlow Winona, 1241 Bundy Blvd., P.O. Box 5580, Winona, Minnesota, USA 55987-5580; telephone: +1 (507) 454-5300; fax: +1 (507) 452-4507. © Copyright 2001 by Watlow Winona, Inc. (2143) All rights reserved.

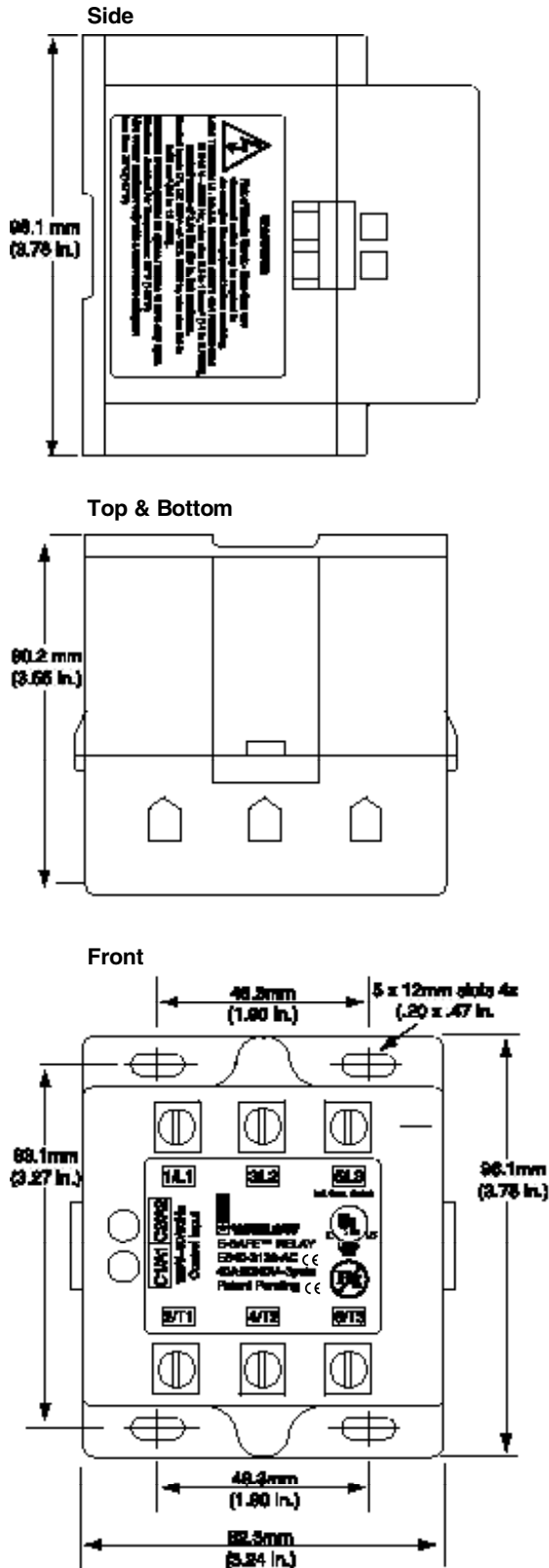


CAUTION or
WARNING



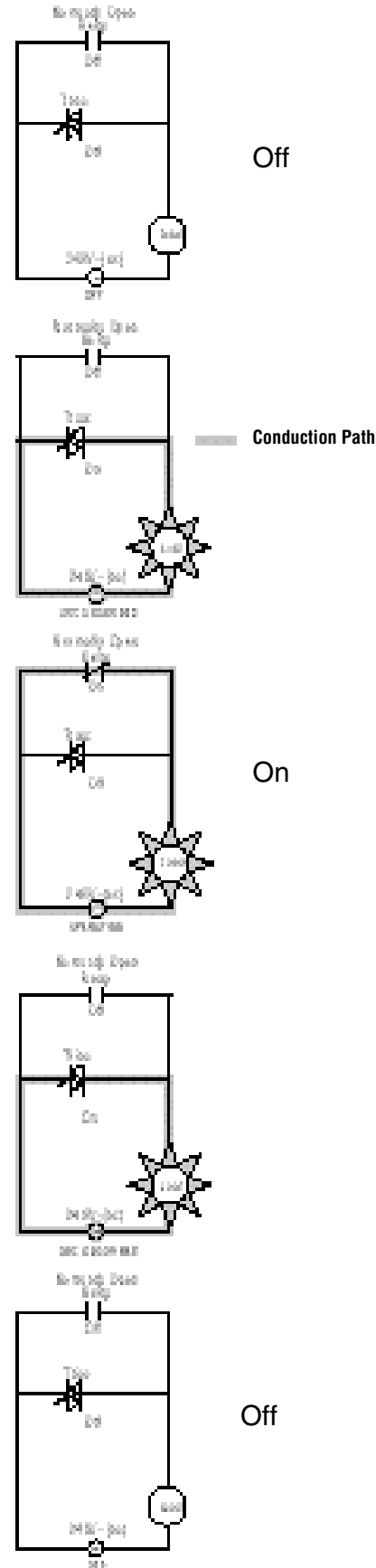
Electrical
Shock Hazard
CAUTION or
WARNING

Unit Dimensions



CAUTION: Provide proper enclosure ventilation to maintain an operating environment <55°C maximum ambient rating. Failure to do so could cause damage to equipment and property.

E-SAFE Relay in Operation



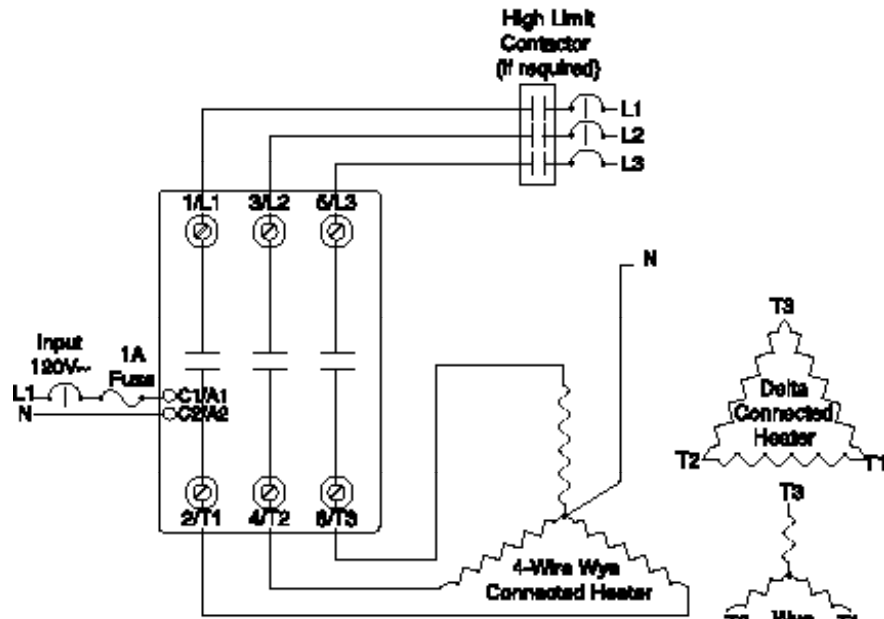
Input and Output Wiring



WARNING:
Wiring must conform to National Electric Code (NEC) safety standards, as well as locally applicable codes. Failure to do so could result in personal injury or death.



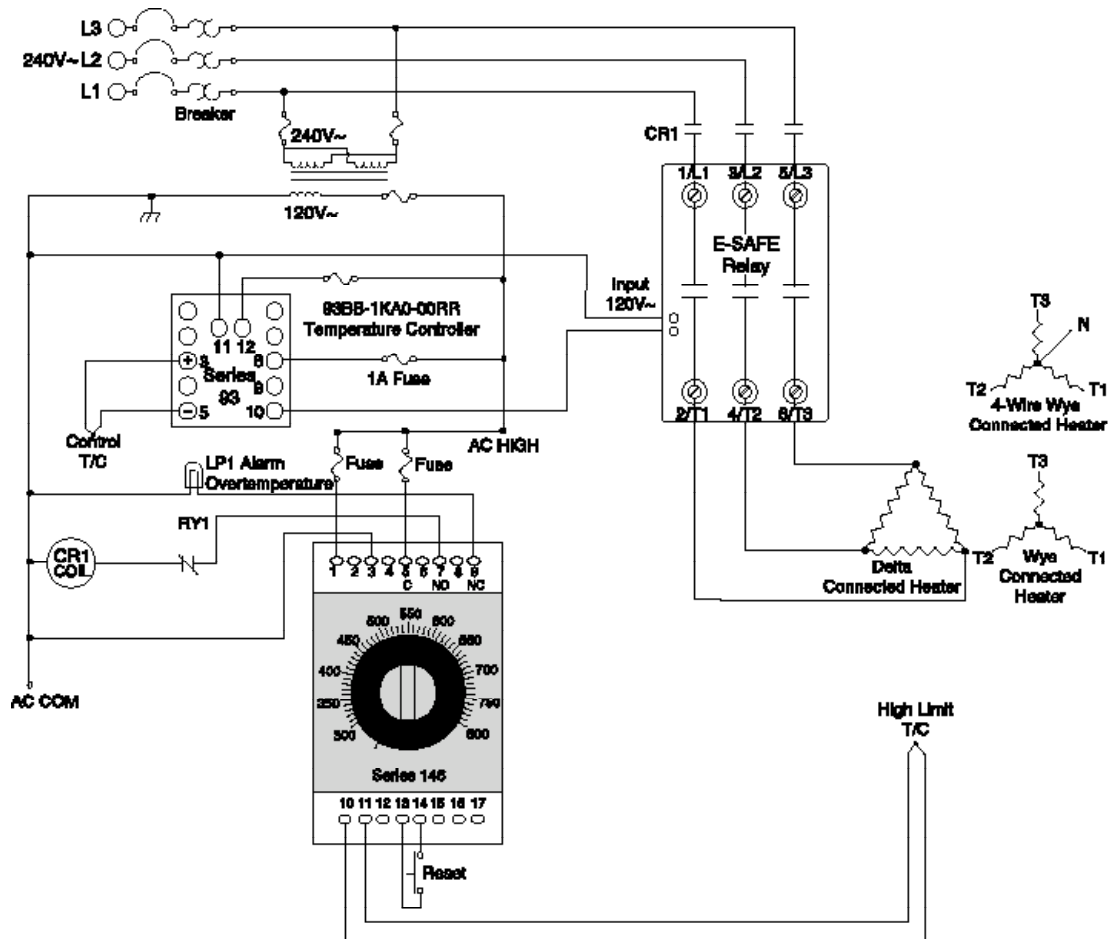
WARNING:
Only authorized and qualified personnel should install and service the E-SAFE relay. Failure to comply with these recommendations may result in damage to equipment and property and injury to personnel.



Torque Guidelines :

- Properly torqued line & load terminals to 3.95 nm (35 in-lbs)
- Retorque after 48 hours to minimize wire cold flow.
- Re-torque line & load terminals every 36 months.

System Wiring Example



Specifications

(2146)

Control Mode

- Zero cross switching output
- Form A outputs, without arcing
- Cycle rate: 30 cycles per minute, maximum

Input Command Signal

- 24V~ (+10% / -10%) @ 0.375 Amperes
- 120V~ (+10% / -10%) @ 0.075 Amperes
- 220V~ (+15% / -20%) @ 0.041 Amperes
- 50/60 Hz
- Input Surge current and pulse characteristics
 - 24 volt input = 24 Amp surge, less than 10VA required (0.41 A)
 - 120 volt input = 16 Amp surge, less than 12VA required (0.101 A)
 - 220 volt input = 8 Amp surge, less than 14VA required (0.063 A)
- Power factor approximate 0.58, 100 uSec pulse width or surge.
Note:
Do not use a RC snubber on the Esafe input or the temperature control command signal output

Output Rating

- 20A to 40A max. per pole into a resistive load, model number dependent
- 208/240V, 50/60 Hz, phase to phase
- 3-pole
- Leakage current: 0.5mA max.

Operating Life

- 1,000,000 switching cycles at maximum rating

Weight/Dimensions

- Weight: 0.560 Kg (1.25 lb)
- 96.0 mm (3.78 in) high x 82.3 mm (3.24 in) wide x 90.2 mm (3.55 in) deep

Terminals

- Control input: Compression, accept 0.2 to 6 mm² (# 22 -10 AWG) wire, torque to 0.8 Nm (7 in-lbs) maximum
- Output: Compression, accept 2.5 to 16 mm² (# 14- 6 AWG) wire, torque to 3.95 Nm (35 in-lbs) maximum

Operating Environment

- Operating temperature, -30 to 55°C/-22 to 130°F
- 5 to 85% RH, non-condensing
- Storage temperature, -40 to 85°C/-40 to 185°F

Mounting

- Fits footprint of definite purpose relays and most 30 to 50 amp mercury relays

Agency Approvals

- UL@ 508 listed, C-UL, File #E213822

Declaration of Conformity

Series E-Safe Relay

Watlow Winona, Inc.
1241 Bundy Blvd.
Winona, MN 55987 USA



Declares that the following product:

Designation:	Series E-Safe
Model Numbers:	ES (20 or 40) - 3 (024, 120, 220) - ACCE
Classification:	Mechanical Relay, AC-51 Utilization Category for Resistive Loads, Installation Category II, Pollution degree 2
Rated Voltage and Frequency:	Load 24-240 V~(ac) 50/60 Hz, Control Signal 24 V~, 120 V~ or 200-240V~
Rated Power Consumption:	Load 20 A or 40 A depending on model. Control Signal 15 VA Max.

Meets the essential requirements of the following European Union Directives by using the relevant standards show below to indicate compliance.

89/336/EEC Electromagnetic Compatibility Directive

EN 60947-4-3	2000	Low-voltage switchgear and controlgear - Contactors and motor-starters - AC semiconductor controllers and contactors for non-motor loads. Industrial immunity, Class B emissions.
EN 61000-4-2	1995	Electrostatic Discharge Immunity
EN 61000-4-3	1996	Radiated Field Immunity
EN 61000-4-4	1995	Electrical Fast-Transient / Burst Immunity
EN 61000-4-5	1995A1:1996	Surge Immunity
EN 61000-4-6	1996	Conducted Immunity
EN 61000-4-11	1994	Voltage Dips, Short Interruptions and Voltage Variations Immunity
EN 61000-3-2	2000 ED.2	Harmonic Current Emissions

73/23/EEC Low-Voltage Directive

EN 60947-4-3	2000	Low-voltage switchgear and controlgear- Contactors and motor-starters - AC semiconductor controllers and contactors for non-motor loads.
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Raymond D. Feller III
Name of Authorized Representative

Winona, Minnesota, USA
Place of Issue

General Manager
Title of Authorized Representative

February 2004
Date of Issue

Signature of Authorized Representative

Ordering Information

(2145)

Part Number

Amperage

20 = 20 amp
40 = 40 amp

Number of Poles

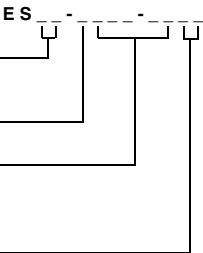
3 = 3-pole

Control Voltage

024 AC = 24 V~
120 AC = 120 V~
220 AC = 220 V~

Label Options

00 = Standard Product
CE = With CE mark



Quality and Mission Statement:



Watlow Winona will be the world's best supplier of superior thermal solutions by exceeding the expectations of our customers, shareholders, and employees.

Your Authorized Watlow Distributor: